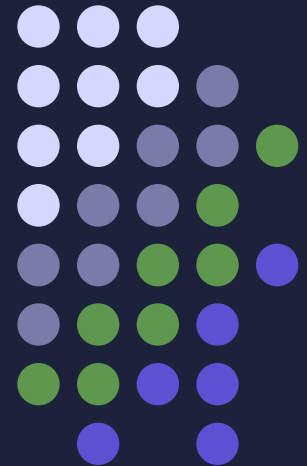


# Incomplete and codominance

Mr. Yeung



# Snapdragon flowers



# Use your monohybrid cross knowledge



rr

X



RR

# Monohybrid cross



|                  |    |    |
|------------------|----|----|
| Red →<br>White ↓ | R  | R  |
| r                | Rr | Rr |
| r                | Rr | Rr |



# What are the results?

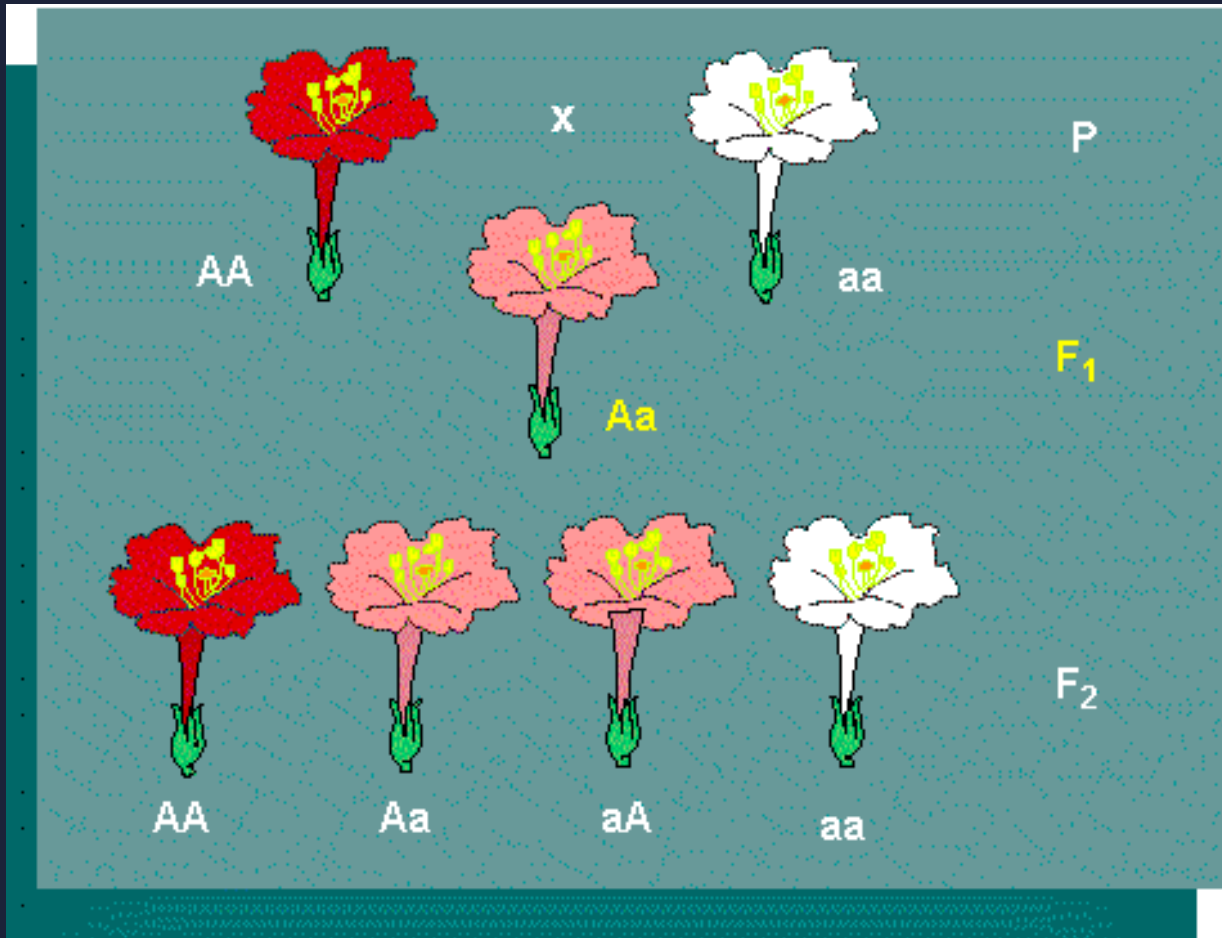
- R = allele for red flowers  
r = allele for white
- RR x rr ---> 100% Rr
- So what is Rr's phenotype?
- Neither red nor white... its PINK!

|                  |    |    |
|------------------|----|----|
| Red →<br>White ↓ | R  | R  |
| r                | Rr | Rr |
| r                | Rr | Rr |



# Incomplete Dominance

- Is a form of intermediate inheritance in which heterozygous alleles ( $Rr$ ) are both expressed, resulting in a combined phenotype.
- The dominant allele in this case does not mask the action of the other (recessive).
- Instead of having one allele being expressed completely (like complete dominance), an intermediate of the two alleles is expressed
- It does not provide evidence to Blending Hypothesis, because the red and white phenotype can be expressed in later generations
- So, just because its pink does not mean the red and white genotypes are lost!



# Codominance



- is a type of inheritance in which two dominance traits are expressed at the same time without blending traits
- Different than incomplete dominance that both alleles are expressed instead of having an intermediate between the two.







# Codominance

- In cattle, a red bull crossed with a white cow will give a roan bull. (One with both red and white fur)

|            |              |              |
|------------|--------------|--------------|
|            | W<br>(White) | W<br>(White) |
| R<br>(Red) | RW<br>(Roan) | RW<br>(Roan) |
| R<br>(Red) | RW<br>(Roan) | RW<br>(Roan) |





# Another example

- In horses, gray horses (GG) are codominant to white horses (WW). The heterozygous horses

|   |    |    |
|---|----|----|
|   | G  | G  |
| W | GW | GW |
| W | GW | GW |





# In blood types

- Recall the four blood types, A, B, AB and O
- The blood groups are an example of multiple allele system for a gene.
- The alleles codes for the antigens attached on the surface of red blood cells.
- Type A would have A antigen
- Type B would have B antigen
- Type AB would have both A & B antigen
- Type O would have none



# Blood types

- Allele A will be dominant – and expresses an enzyme forming A antigen
- Allele B will be dominant – and expresses an enzyme forming B antigen
- Allele O will be recessive (oo)– and produces a non-functioning protein
- If someone has AB allele, then both A and B antigens will be expressed or codominates
- AO or BO will lead to A antigen and B antigen respectively.



| Blood Groups | Possible genotypes |
|--------------|--------------------|
| A            | AA, AO             |
| B            | BB, BO             |
| AB           | AB                 |
| O            | OO                 |

# Examples



AB Blood crosses with A blood

A Blood crosses with B blood

AB X AO

|   | A  | B  |
|---|----|----|
| A | AA | AB |
| O | AO | BO |

1/4 Type AB  
1/4 Type B  
1/2 Type A

AO x BO

|   | A  | O  |
|---|----|----|
| B | AB | BO |
| O | AO | OO |

1/4 Type AB  
1/4 Type B  
1/4 Type A  
1/4 Type O

# Summary



| Complete Dominance  | Incomplete Dominance   | Codominance   |
|---|--|---|
| Dominant allele masks the recessive allele (Rr).                                  | Crossing between dominant and recessive allele will get a 'blending' or an intermediate of the two                 | Both alleles will be expressed at the same rate.                                    |
| Ex. Heterozygous green peas will give rise to 75% green peas and 25% yellow peas. | Ex. White flowered Snapdragons crosses with red flowered Snapdragons will give rise to pink flowered Snap dragons. | Ex. White and red hair in cattle will both be expressed giving roan (white and red) |